Beitrag 196, Volkswirtschaftliche Diskussionsreihe, Universität Augsburg

Emergence of Electronic Markets: Implication of Declining Transport Costs on Firm Profits and Consumer Surplus

Karl Morasch*, Peter Welzel**
Universität Augsburg

Juli 2000

Abstract: Electronic coordination may drastically reduce transport costs, especially for digital or digitalizable products where local markets may actually shrink to a point in space. In the present paper we use a model with differentiated products to analyze the impact of declining transport costs on profits and consumer surplus. While consumers always gain, the effect on producers depends on the degree of product differentiation and the magnitude of transport costs in the electronic market mode. Profits do only rise if products are substantially differentiated – in this case the positive effect of an extended consumer base due to the preference for product differentiation dominates the negative effect of intensified competition. This result is amplified if transport costs in the electronic market mode are substantial. In this case profits only increase if products are almost independent.

Zusammenfassung: Durch elektronische Koordination reduzieren sich Transportkosten zum Teil erheblich – bei digitalen Produkten kann aus bislang regional abgegrenzten lokalen Märkten sogar ein Punktmarkt entstehen. Im vorliegenden Papier wird in einem Modell mit Produktdifferenzierung die Auswirkung dieser Verringerung der Transportkosten auf die Unternehmensgewinne und die Konsumentenwohlfahrt thematisiert. Während die Konsumenten immer profitieren, hängt die Auswirkung für die Produzenten vom Grad der Produktdifferenzierung und der Höhe der Transportkosten bei elektronischer Koordination ab. Die Gewinne steigen nur bei relativ ausgeprägter Produktdifferenzierung – in diesem Fall dominiert der positive Effekt durch die Ausweitung der Nachfrage aufgrund der Präferenz der Konsumenten für Produktdifferenzierung den negativen Effekt über die verstärkte Wettbewerbsintensität. Dies gilt um so mehr, wenn auch beim Verkauf über den elektronischen Markt noch ausgeprägte Transportkosten anfallen. Nur bei weitgehend unabhängigen Produkten ergibt sich dann noch ein Vorteil durch die Entstehung des elektronischen Marktes.

Keywords: Electronic markets, Transport Costs, Product Differentiation

JEL classification: D43, D61, L13,

---

* PD Dr. Karl Morasch, WiSo-Fakultät, Universität Augsburg, D-86135 Augsburg, Phone +49-821598-4196, Fax +49-821-598-4230, E-Mail: karl.morasch@wiso.uni-augsburg.de

** Prof. Dr. Peter Welzel, WiSo-Fakultät, Universität Augsburg, D-86135 Augsburg, Phone +49-821598-4185/86, Fax +49-821-598-4230, E-Mail: peter.welzel@wiso.uni-augsburg.de

1 Introduction

Selling products on an electronic market place instead of a traditional market may drastically reduce search and transport costs and, especially in the case of digital or digitalizable products or services (e.g. software or financial services). Given the rising importance of electronic marketplaces, the implications of these cost changes on firm conduct and market performance are of great interest to managers and policy makers. The present paper attempts to shed some light on the issues involved.

The impact of changing search costs has already been discussed in detail in a recent paper by Bakos [see BAKOS97] that builds on the location model of [SALOP79]: A decrease in search costs due to electronic coordination may enable the existence of a market that would otherwise break down. While this effect works to the benefit of both sides of the market, generally the position of consumers is improved because the market power of the sellers is reduced due to lower search costs. As one would expect, the incentive to invest in electronic coordination devices is too low for sellers and too high for buyers (from the point of view of total surplus). More recently, Salop's model has also been used in [BOUCKAERT00] to analyze the entry of a mail order business into a traditional market which may also be interpreted as an analysis of an e-commerce entry. The present paper can be seen as complementary to [BAKOS97] because it is concerned with transport costs instead of search costs and applies a model of symmetric product differentiation instead of a location model.

Another closely related paper is [DÜMPE99] which deals with transport costs in a homogenous good price setting duopoly. In a two location model he assumes that transport costs are reduced to zero by the emergence of an electronic market and that an additional consumer base may be served via electronic coordination. Because price competition by symmetric firms offering a homogenous good necessarily yields zero profits [see e.g. MARTIN93, pp.37-38], selling via the electronic market is profitable for a single firm because of the monopoly achieved in the additional market, but leads to a prisoners' dilemma situation with zero profits if both firms enter the electronic market. However, these results in [DÜMPE99] originate from a very specific framework which leads us to conjecture that they may not hold in a more general model. We therefore generalize the analysis of Dümpe by considering differentiated products and positive transport costs under electronic coordination. This more general setting also enables us to drop the somewhat artificial assumption of an additional consumer base only be served by electronic coordination.

In the present paper we will concentrate on the influence of the degree of product differentiation and the magnitude of transport costs under electronic coordination on the profit change caused by the emergence of the electronic market. This should serve as a starting point for the analysis of strategic reactions of firms in further research.

In the main part of the paper we first introduce the differentiated product oligopoly model to be used for an analysis of the questions raised above. This model is more general than the one applied in the subsequent sections of the present paper, and we will therefore briefly discuss in the concluding section which additional effects may and should be analyzed in future research using the more general framework. In a second step, after introducing some more specific assumptions, we discuss how the degree of product differentiation influences the profit impact of the emergence of an electronic market without transport costs. Finally, in our third step we deal with the question of how the results are changed if the emergence of the electronic market makes it possible to sell to one's competitor's location, however, at a transportation cost which exceeds the one of the local firm.

2 A Differentiated Product Oligopoly Model in Space

To analyze the impact of electronic markets on firm behavior and market conduct we use the following model structure: Initially there are two local markets which are separated by prohibitively high transport costs. There are two firms, each located in one of these two markets, which produce a specific type of a symmetrically differentiated product [see DIXIT/STIGLITZ77 and SPENCE76 for the concept of symmetric product differentiation]. Product differentiation in this model is exogenous, i.e., we do not consider the firms' differentiation decisions. Consumers value product differentiation per se, but in the base scenario without electronic markets due to entry barriers and high transportation costs in each of the local markets a monopolistic producer only offers one specific kind of product or service. A change in technology then creates the opportunity to sell this product or service via an electronic market. Because transport costs to the other location are much lower in this setting, a firm will now be able to sell its product or service also to the market where it is not located.

This model structure may be applied to discuss an number of interesting questions: How are profits and consumer welfare affected by the (exogenous) emergence of an electronic market? What can be said about the incentives of firms or consumer to invest in a reduction of transport costs and the creation of an electronic market? How will firms adjust their strategies if selling via electronic markets becomes a viable option? In the present paper we focus our attention on the presentation of the model and on the first question. Further research will deal with the more advanced topics.

2.1 Base Model

We apply the following assumptions:

- The consumption side in each market is given by an representative consumer with linear-quadratic utility $u_i = \boldsymbol{a}_i(x_{i1} + x_{i2}) - \frac{1}{2}(x_{i1}^2 + x_{i2}^2 + 2\boldsymbol{b}\, x_{i1}x_{i2}) + x_0$ with $i \in \{1,2\}$ indicating consumption in location 1 and 2, respectively, x_{ij} being the consumption quantity in i of the product or service produced by the firm located in j, and x_0 a numéraire good which is assumed to be produced in another sector of the economy and has been added linearly to ensure that the marginal utility of income is equal to one. The parameter $\boldsymbol{a}_i$ is a measure of market size while $\boldsymbol{b} \in [0,1]$ describes the degree of substitutability between the products of the two firms: If $\boldsymbol{b} = 1$ the products are perfect substitutes, if $\boldsymbol{b} = 0$ they are independent.

- The production cost of firm *j* is generally given by $c_j = c_j^f + c_j^v (x_{1j} + x_{2j})^s$, where c_j^f are fixed costs and c_j^v variable costs. For $c_j^f > 0$ we get a standard U-shaped cost curve if $s > 1$, while $s \le 1$ yields a natural monopoly. Most of the time we focus on $s = 1$. Under this assumption which can be considered a benchmark case pricing or output decisions for the two markets are independent, which considerably facilitates the derivation of the equilibria. If entry of a new, i.e., third, competitor is not an issue, as will be assumed in the present paper, we can even set c_j equal to zero because this will not affect the qualitative results in the linear-quadratic model.

- Concerning transport costs we always assume that entry into the competitor's local market is blockaded initially, i.e., before the option of the electronic market emerges, and that no transport costs are incurred when serving one's own local market. After the emergence of the electronic market, which in the present paper is modeled as an exogenous event, we assume that from then on the product can be sold to the competitor's location at non-negative transport costs t which are now longer prohibitive. Endogenous transport costs can be modeled by assuming that firms (or alternatively consumers) may invest in a reduction e_i of transport costs from good *i* to location *j*

Within the framework of this general model, in this paper we focus our attention on two scenarios applying more specific assumptions:

- Transport costs are reduced to zero. Firms produce with constant average costs. It will be shown how the emergence of the electronic marketplace affects consumer welfare and firm profits. This is a good starting point to discuss the incentives of firms to invest in establishing an electronic marketplace. As will be shown firms only gain if the products are considerably differentiated.

- There is an exogenous reduction of transport costs. However, these costs are still higher for the product or service bought from the other location. Varying these transport cost we can see how the extent of cost reductions affects the impact on consumer welfare and firm profits.

Based on the results obtained, there will be a short discussion of the impact on firm incentives to invest in the establishment of an electronic market (higher investment yielding lower transport costs) before they compete in the product markets.

2.2 Exogenous Emergence of an Electronic Market with No Transport Cost

To make the analysis in this section as simple as possible, we make the following assumptions:

- Transport costs for firms selling to their local market and transport costs in the electronic market are zero, whereas transport costs to the other local market if served in the "traditional" mode are prohibitive.

- The emergence of the electronic market is an exogenous event, i.e., firms do not have to invest to establish such a market and to lower their transport costs to the other location to $t = 0$.

- The size of the two markets is identical and for ease of computation normalized to $\boldsymbol{a}_1 = \boldsymbol{a}_2 = 1$. Average costs of the firms are also identical, assumed to be constant, and normalized to zero, which implies $c_1(x_1) = c_2(x_2) = 0$. These two symmetry assumptions allow us to restrict attention to one of the two markets when calculating an equilibrium.

- When both firms are active in a local market, as will be the case after the emergence of the electronic market, we assume that they compete in prices. This assumption seems particularly relevant for digital products which face no capacity constraint.

In this context the impact of the emergence of an electronic market can easily be derived by comparing the situation in the initial monopoly in one of the markets with the two firm price-setting oligopoly arising in the electronic market mode. Because we need to consider only one market explicitly, the index i will be dropped henceforth to simplify the notation.

2.2.1 Derivation of the Monopoly Solution and the Duopoly Equilibrium

We first have to derive consumer demand based on the underlying utility function. Given our assumptions about the market size parameter, the consumer maximization problem leads to linear inverse demand functions $p_j = 1 - x_j - \boldsymbol{b} x_l$ with $l \neq j$ for the duopoly situation and $p_j = 1 - x_j$ under local monopoly. However, to determine the equilibrium with price strategies under duopoly we need demand functions expressing quantity demanded as a function of the two prices. Based on the two inverse demand functions this is a straightforward calculation which yields

(1) $$x_j(p_1, p_2) = 1/(1-\beta^2)[(1-\beta) - p_j + \beta p_l].$$

The monopoly solution can easily be computed: Monopoly profits are given by $\pi_j^M = p_j x_j = (1 - x_j)x_j$. This yields $1 - 2x_j = 0$ as first order condition for profit maximization and thus $x_j^M = 1/2$ and $p_j^M = 1/2$ as monopoly quantities and prices, respectively.

As already mentioned, the output or quantity decisions of a firm for the two local markets are independent of each other as long as $s = 1$. Because we want to determine the equilibrium in price strategies, we need firm profits as a function of the two prices:

(2) $$\pi_j(p_1, p_2) = p_j\{1/(1-\beta^2)[(1-\beta) - p_j + \beta p_l]\}.$$

Partially differentiating the profit functions we obtain the following system of two first-order conditions which must be solved with respect to (p_1, p_2) to obtain the equilibrium prices:

(3) $$\frac{1}{1-\beta} - \frac{2}{1-\beta^2} p_1 + \frac{\beta}{1-\beta^2} p_2 = 0$$

(4) $$\frac{1}{1-\beta} - \frac{2}{1-\beta^2} p_2 + \frac{\beta}{1-\beta^2} p_1 = 0$$

Solving this system yields $p_1^D = p_2^D = (1-\beta)/(2-\beta)$ and the corresponding equilibrium quantities are given by $x_1^D = x_2^D = 1/[(2-\beta)(1+\beta)]$.

Based on this information we can now deal with the question how consumer welfare and firm profits are affected by the emergence of the electronic market. At first glance the reduction of transport costs seems to benefit all market participants. However, while this presumption is correct with respect to consumers, the effect on producers' profits crucially depends on the degree of product differentiation.

2.2.2 Impact on Consumer Surplus

In a first step we will confirm our statement about the impact on consumers. Note that consumer surplus in a market with symmetrically differentiated products must be calculated based on the utility function – it is not correct to add up the values for consumer surplus in the market for each specific product [see VIVES85]. Taking into account that consumers have to pay the market price for each unit of the product we obtain the following formula for consumer surplus (net utility) derived from the consumption of x_1 and x_2:

(5) $$CS = (1-p_1)x_1 + (1-p_2)x_2 - \tfrac{1}{2}(x_1^2 + x_2^2 + 2\boldsymbol{b}\, x_1 x_2)$$

Inserting equilibrium prices and quantities under monopoly and under duopoly into the formula for consumer surplus, it can easily be seen that consumers are better off for all permissible values of $\boldsymbol{b}$:

(6) $$CS^M = (1-\tfrac{1}{2})\tfrac{1}{2} - \tfrac{1}{2}(\tfrac{1}{2})^2 = \tfrac{1}{8}$$

(7) $$CS^D = 2\cdot\left[\left(1-\frac{1-\boldsymbol{b}}{2-\boldsymbol{b}}\right)\frac{1}{(2-\boldsymbol{b})(1+\boldsymbol{b})}\right] - \tfrac{1}{2}\left[2\cdot\left(\frac{1}{(2-\boldsymbol{b})(1+\boldsymbol{b})}\right)^2 + 2\boldsymbol{b}\left(\frac{1}{(2-\boldsymbol{b})(1+\boldsymbol{b})}\right)^2\right] =$$
$$= \frac{2}{(2-\boldsymbol{b})^2(1+\boldsymbol{b})} - \frac{1}{(2-\boldsymbol{b})^2(1+\boldsymbol{b})} = \frac{1}{4-3\boldsymbol{b}^2+\boldsymbol{b}^3}$$

In the relevant range for $\boldsymbol{b}$ the consumer surplus takes values between $\tfrac{1}{4}$ (for $\boldsymbol{b}=0$) and $\tfrac{1}{2}$ (for $\boldsymbol{b}=1$), therefore always exceeding $\tfrac{1}{8}$, the consumer surplus under monopoly.

Why do consumers always gain? The reason is that the emergence of the electronic market has two positive effects for consumers: An additional, at least somewhat differentiated product becomes available (consumers value product diversity!), and the market power of the local producer is reduced due to competition from the second firm. If products are independent ($\boldsymbol{b}=0$), only the first effect is relevant. With rising $\boldsymbol{b}$ substitutability of the products increases and thus the competition effect becomes more important. For $\boldsymbol{b}=1$ products are perfect substitutes, and the emergence of the electronic market solely leads to intensified competition.

2.2.3 Impact on Firm Profits

What can be said about the impact on producers? Here we see two countervailing forces at work: On the one hand, market volume grows because consumers value product differentiation. On the other hand, competition reduces market power. If the products are independent, only the first effect is relevant, if they are perfect substitutes, only the second one. We can thus state a result which, by the way, is independent of our linear-quadratic specification: Firms will gain from the emergence of the electronic market if they produce independent products and they will loose if they produce perfect substitutes [see also DÜMPE99]. Our model allows us to determine the degree of substitutability that is necessary for the market volume effect to dominate the impact of intensified competition.

To determine the critical value $\hat{\boldsymbol{b}}$ of product differentiation, where a higher degree of substitutability yields a negative impact of electronic markets on firm profits and a lower degree a positive impact, we will now compare the monopoly profits with the sum of duopoly profits. Inserting the results derived above for x^M and p^M into the profit function of the monopolist, and the values of x_j^D and p_j^D into the profit functions of the duopoly firms yields

(8) $\quad \boldsymbol{p}^M = \tfrac{1}{2} \cdot \tfrac{1}{2} = \tfrac{1}{4}$ and

(9) $\quad \Pi^D = \boldsymbol{p}_1^D + \boldsymbol{p}_2^D = 2 \cdot \frac{(1-\boldsymbol{b})}{(2-\boldsymbol{b})} \left\{ \frac{1}{(1-\boldsymbol{b})} \frac{1}{1-b} \left[(1-\boldsymbol{b}) - \frac{(1-\boldsymbol{b})}{(2-\boldsymbol{b})} + \boldsymbol{b} \frac{(1-\boldsymbol{b})}{(2-\boldsymbol{b})} \right] \right\} = \frac{2(1-\boldsymbol{b})}{(1+\boldsymbol{b})(2-\boldsymbol{b})^2}$

Setting the difference between Π^D and $\boldsymbol{p}^M$ to zero and solving for $\boldsymbol{b}$ we obtain $\hat{\boldsymbol{b}} = 0.611709$[1], i.e., firms only gain from the emergence of the electronic market if products are considerably differentiated.

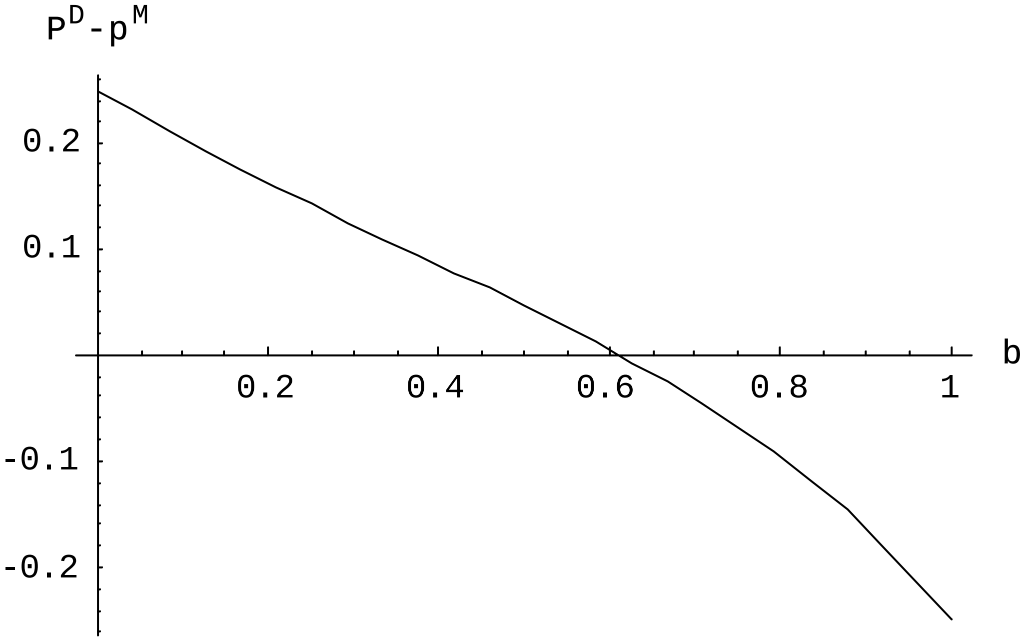

Figure 1: Degree of product differentiation and impact on firm profits

Figure 1 shows the difference in profits for all permissible values of $\boldsymbol{b}$: While profits are doubled relative to the initial situation in the case of independent products, they are reduced to zero if the products are perfect substitutes. Note, however, that the impact on total welfare is always positive: In the relevant range for $\boldsymbol{b}$ the gain in consumer surplus takes values between $\tfrac{1}{8}$ (for $\boldsymbol{b} = 0$) and $\tfrac{3}{8}$ (for $\boldsymbol{b} = 1$). It thus dominates the negative impact on profits for $\boldsymbol{b} > \hat{\boldsymbol{b}}$.

[1] The exact value for $\hat{\boldsymbol{b}}$ is given by $1 + \frac{(2\sqrt{114}-9)^{1/3}}{3^{2/3}} - \frac{5}{(6\sqrt{114}-27)^{1/3}}$

2.3 Transport Costs and Profit Impact of Electronic Markets

In the preceding section we made the somewhat extreme assumption that transport costs to the other competitor’s location are reduced to zero once the product is sold via the electronic market. While this may be close to reality for digital products like MP3 recordings, in many instances the product itself still has to be physically delivered to the customer, or some form of complementary local service is necessary. While transport costs are not reduced to zero in such a scenario, they may still be reduced enough to be no longer prohibitive. In this section we therefore analyze how higher, strictly positive, transport costs for the firm from the other location affect the border value $\hat{\boldsymbol{b}}$.

While the results for the initial monopoly situation remains unaffected, we must now consider an asymmetric duopoly in the electronic market setting: If buying a good produced by the firm from the other location, a customer has to pay an additional amount t per unit, the transport costs.

Analyzing such an asymmetric duopoly model is a bit more complicated since a combination of high transport costs and a relatively high degree of substitutability may block entry of the competitor from the other location. This points already to the likely result of the following analysis: Because an asymmetric duopoly is only viable in a situation with high transport costs as long as products are relatively independent, the border value of $\hat{\boldsymbol{b}}$ will presumably decrease with rising transport costs.

To validate this presumption we first derive the equilibria of the asymmetric duopoly contingent on $\boldsymbol{b}$ and t. Inserting equilibrium prices into the formula for joint duopoly profits and comparing these with the monopoly profit then enables us to show how $\hat{\boldsymbol{b}}$ changes with t.

Profits as function of the two prices for the local firm, indexed 1, and the firm from the other location, indexed 2, are now given by

(10) $\boldsymbol{p}_1^t(p_1, p_2) = p_1\{1/(1-\boldsymbol{b}^2)[(1-\boldsymbol{b}) - p_1 + \boldsymbol{b}(p_2 + t)]\}$ and

(11) $\boldsymbol{p}_2^t(p_1, p_2) = p_2\{1/(1-\boldsymbol{b}^2)[(1-\boldsymbol{b}) - (p_2 + t) + \boldsymbol{b}p_1]\}$.

As in section 2.2, the equilibrium is determined by partially differentiating the profit functions and solving the resulting system of first order conditions with respect to (p_1, p_2). Doing this, we obtain

(12) $p_1^D = \dfrac{(1-\boldsymbol{b})(2+\boldsymbol{b}) + t\boldsymbol{b}}{(2-\boldsymbol{b})(2+\boldsymbol{b})}$ and

(13) $$p_2^D = \frac{(1-\boldsymbol{b})(2+\boldsymbol{b}) - t(2-\boldsymbol{b}^2)}{(2-\boldsymbol{b})(2+\boldsymbol{b})}.$$

Note that p_2^D is the price earned by the firm from the other location. Consumers have to pay

(14) $$p_2^D + t = \frac{(1-\boldsymbol{b})(2+\boldsymbol{b}) + 2t}{(2-\boldsymbol{b})(2+\boldsymbol{b})}$$

for this product. A higher transport cost therefore always has a negative impact on consumers. However, this is not necessarily true for producers, because here the (indirect) positive effect of reduced competition may dominate the (direct) negative impact of the higher transport costs. Joint profits of the two firms in one local market can be determined by inserting the equilibrium values into the profit functions:

(15) $$\Pi^D = \boldsymbol{p}_1^D + \boldsymbol{p}_2^D = \frac{2(1-t)(1-\boldsymbol{b})^2(2+\boldsymbol{b})^2 - t^2(4-3\boldsymbol{b}^2+\boldsymbol{b}^4)}{(1+\boldsymbol{b})(1-\boldsymbol{b})(2-\boldsymbol{b})^2(2+\boldsymbol{b})^2}$$

We are now interested in the solutions of the equation $\Pi^D - \boldsymbol{p}^M = 0$ in $(\boldsymbol{b}, t)$-space for the relevant parameter ranges $\boldsymbol{b} \in [0,1]$ and $t \in [0,1)$ (note that for $t = 1$ even a monopolist could not earn any profit in a market with inverse demand $p = 1 - x$). Solving this equation we have to keep in mind the additional restriction that profits of the firm from the other location be positive. Solving $\boldsymbol{p}_2^t(p_1^D, p_2^D) = 0$) with respect to t yields

(16) $$\bar{t} = \frac{(1-\boldsymbol{b})(2+\boldsymbol{b})}{2-\boldsymbol{b}^2}.$$

For all transport costs below $\bar{t}$ two firms will be active in the case of electronic coordination, whereas for higher transport cost entry is blockaded even after the opening of the electronic market. The equation $\Pi^D - \boldsymbol{p}^M = 0$ does not readily lend itself to an analytical solution with respect to $\boldsymbol{b}$, but being a standard quadratic equation in t the solution with respect to this parameter is straightforward and is given by

(17) $$t = \frac{2(1-\boldsymbol{b})^2(2+\boldsymbol{b})^2 + \sqrt{\boldsymbol{b}^2(4-\boldsymbol{b}^2)^2(1-\boldsymbol{b}^4)}}{2(4-3\boldsymbol{b}^2+\boldsymbol{b}^4)}.$$

Figure 2 indicates the parameter combinations $(\boldsymbol{b}, t)$ where the emergence of the electronic market benefits firms (to the left of the borderline) and where firms are hurt (to the right).

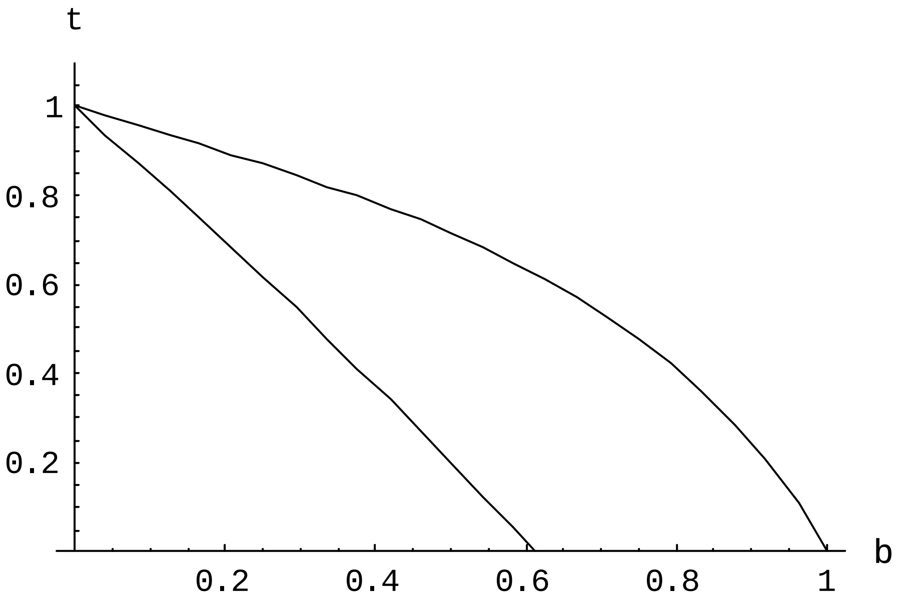

Figure 2: Impact of transport costs and product differentiation on profitability

As can be seen, for higher transport costs profits only rise if products are more independent of each other. Note that rising transport costs have two effects on firm profits: The extra profit derived from products sold to the other location will be reduced. On the other hand, the competitive pressure on the former local monopolist is reduced. As has been shown, the first effect will dominate here.

3 Conclusion

Starting from the presumption that electronic coordination reduces transport costs we discussed the impact of such a reduction on profits and consumer surplus in a duopoly framework with differentiated products. It has been shown that consumers always benefit, while producers' profits only rise if products are differentiated substantially. This is even more so if transport costs are still significant under the electronic market mode: In this case profits only rise if products are almost independent.

In reality substantial investments are usually necessary to implement an electronic marketplace. Given our results, the investment incentives of firms are likely to be suboptimal. However, assuming an endogenous reduction of transport costs by such an investment, there may be an additional strategic investment incentive since higher investment means lower transport costs relative to the rival. It seems interesting to analyze both from the perspective of a producer and from the point of view of total surplus whether this effect is strong enough to dominate the incentive for underinvestment. In our future research we plan to address this issue by endogenizing the creation of an electronic market or electronic distribution channel.

Bibliography

[BAKOS97] Bakos, J.Y.: Reducing Buyer Search Costs: Implications for Electronic Marketplaces, Management Science, Vol. 43, pp. 1676-1629

[BOUCKAERT00] Bouckaert, J.: Monopolistic Competition with a Mail Order Business, Economic Letters, Vol. 66, pp. 303-310

[DIXIT/STIGLITZ77] Dixit, A., Stiglitz, J.: Monopolistic Competition and Optimum Product Diversity, American Economic Review, Vol. 67, pp. 287-308.

[DÜMPE99] Dümpe, O.: Chancen und Risiken von Netzmärkten für Anbieter - eine spieltheoretische Analyse, Diskussionspapiere des Instituts für Betriebswirtschaftslehre der Universität Augsburg, Diskussionspapier WI-69

[MARTIN93] Martin, S.: Advanced Industrial Economics, Oxford, 1993

[SALOP79] Salop, S.: Monopolistic Competition with Outside Goods, Bell Journal of Economics, Vol. 10, pp. 141-156.

[SPENCE76] Spence, M.: Product Selection, Fixed Costs and Monopolistic Competition, Review of Economic Studies, Vol. 43, pp. 217-235.

[VIVES85] Vives, X.: On the Efficiency of Bertrand and Cournot Equilibria with Product Differentiation , Journal of Economic Theory, Vol. 36, pp. 166-175